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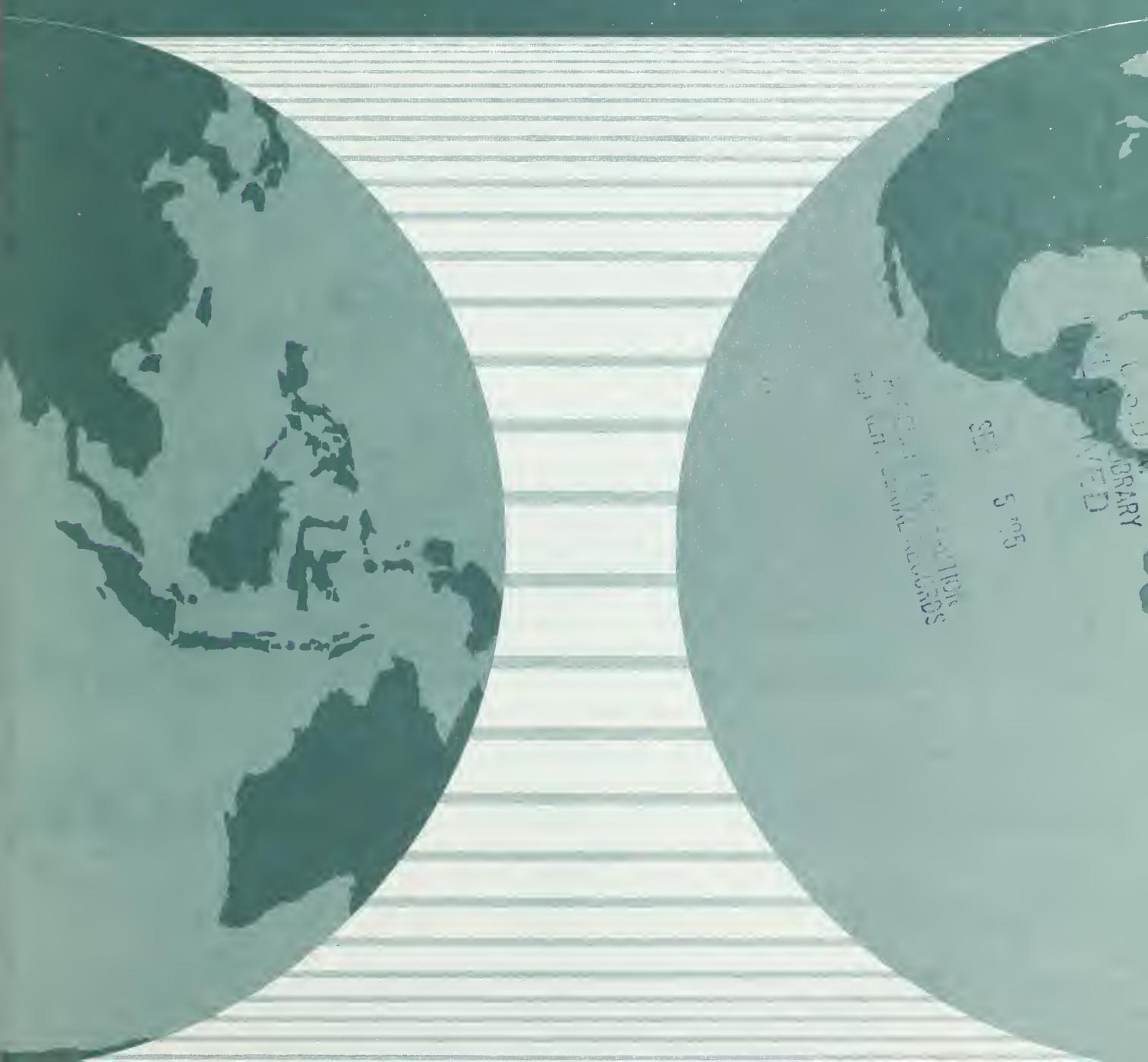
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# Dynamics of Comparative Advantage and the Resistance to Free Trade

Thomas Vollrath





**Dynamics of Comparative Advantage and the Resistance to Free Trade.**  
By Thomas Vollrath, International Economics Division, Economic Research Service, U.S. Department of Agriculture. Foreign Agricultural Economic Report No. 214.

## Abstract

The income gap between developed and developing countries could narrow if developing countries' economies become more responsive to market forces. Primary manufacturing has become the fastest growing component of many developing countries' export growth. The author cites 26 developing countries which have built industries to produce and export basic manufactures, such as clothing, footwear, furniture, electrical machinery, and nonmetal mineral manufacturing. The United States has an interest in developing countries' economic growth because it can provide much of their rapidly growing food import needs.

Keywords: International trade, comparative advantage, development, growth, developing countries, U.S. agricultural exports, U.S. agricultural trade policy.

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## Summary

The income gap between developed and developing countries could narrow if developing countries' economies become more responsive to market forces. Primary manufacturing has become the fastest growing component of many developing countries' export growth. The author cites 26 developing countries which have built industries to produce and export basic manufactures, such as clothing, footwear, furniture, electrical machinery, and nonmetal mineral manufacturing. The United States has an interest in developing countries' economic growth because it can provide much of their rapidly growing food import needs.

This report presents some possible trade strategies for both developing and developed countries and discusses their implications for U.S. agriculture. An effective approach to economic development is a more open trading environment which makes national economies increasingly responsive to the global market, the author says. Exposure to the international market induces innovations and improves resource use, lowering consumer prices or increasing producer profits or both.

The relative export shares for basic manufactures among the developing countries that are not major petroleum exporters more than doubled between 1965-81. That illustrates changes in competitive advantage, an ability to sell primary manufactured goods at a relatively lower cost than can other producers. By contrast, U.S. competitive advantage in basic manufacturing declined during the same period, but increased in both food and agricultural raw materials. Despite these trends, the magnitude of agriculture's relative export share in developing countries which are not major petroleum exporters has consistently remained higher than in the United States. Therefore, agriculture continues to be an important source of foreign exchange in many developing countries.



# Dynamics of Comparative Advantage and the Resistance to Free Trade

by Thomas Vollrath\*

## Introduction

Despite the theoretical gains from international trade, many economists believe that trade between developed and developing countries is harmful to developing countries (10, 35, 36, 41, 42).<sup>1</sup> They contend that the traditional pattern of trade and specialization widens the income gap because it favors the developed countries.

I reject the view that a systematic bias against developing countries exists in global markets, and I argue that an effective approach to economic development is a more open trading environment which makes national economies increasingly responsive to the global market. Trade data support the position that international exchange is beneficial to economic development and growth in developing countries. This report presents some possible trade strategies for both developed and developing countries and discusses their implications for U.S. agriculture.

Increased reliance on the world market enables countries not only to make better use of national resources but also to take advantage of differences in natural resources, technologies, and changing commodity demand among nations. International trade promotes growth and development because exposure to the international market induces innovations and improves resource use, thus lowering consumer prices or increasing producer profits or both.

## A Rationale Underlying the Resistance to Free Trade

A barometer of how developing countries have fared relative to developed countries in world trade can be obtained by evaluating international and external terms of trade.<sup>2</sup> The dissatisfaction of developing countries with the structure and organization of the world market and, in particular, with the traditional pattern of trade and specialization which they inherited from the colonial period largely stems from the fall in the price of agricultural goods relative to manufactured goods. This disparity in price movements is often incorrectly assumed to approximate the external terms of trade of developing countries.

The World Bank's declining index of purchasing power generated by 33 primary commodities exported by developing countries supports the deterioration thesis (fig. 1). Certainly, developing countries which export such commodities as bananas, tea, and rubber have experienced particularly strong downward pressure on their external terms of trade because the export prices of these agricultural goods have sharply declined relative to unit values of manufactured imports (figs. 2 and 3).

Economists in developing countries often attribute declining barter terms of trade to the changing character of import demand which the developed

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<sup>1</sup>Italicized numbers in parentheses refer to literature cited in the Bibliography at the end of this report.

<sup>2</sup>Terms of trade is defined as a ratio of commodity prices. In this report, international (barter) terms of trade primarily has a commodity focus. It shows how much of one commodity must be exported to obtain an import unit of another commodity. External terms of trade is more country specific. It is a composite index of export to import prices based upon all traded commodities. The index of purchasing power measures the "real" prices developing countries receive for primary exports, excluding energy, in terms of the prices they pay for imported manufactured goods.

and developing countries have for each others' commodities. The high income elasticity of developing countries' demand for manufactured goods from industrialized countries means that when incomes increase in developing countries, investors and consumers buy comparatively more manufactured imports than their incomes increase. Correspondingly, developed countries import proportionally fewer primary goods from developing countries as their own incomes rise because developed countries' demand for primary goods from developing countries is income inelastic.<sup>3</sup>

Given these assumptions about commodity demand and the composition of regional trade, several market responses to increased world income are possible: international prices for primary exports from developing countries fall relatively more than their sales volume increases to the rest of the

<sup>3</sup>The developed world's demand for primary products increases less rapidly than the demand for most other commodities as growth continues in the developed countries. Demand for services, for instance, typically increases at a greater rate as income increases than does demand for primary products. In addition, the developed countries' manufactures of many synthetics are often used as input substitutes for raw materials coming from developing countries.

Figure 1

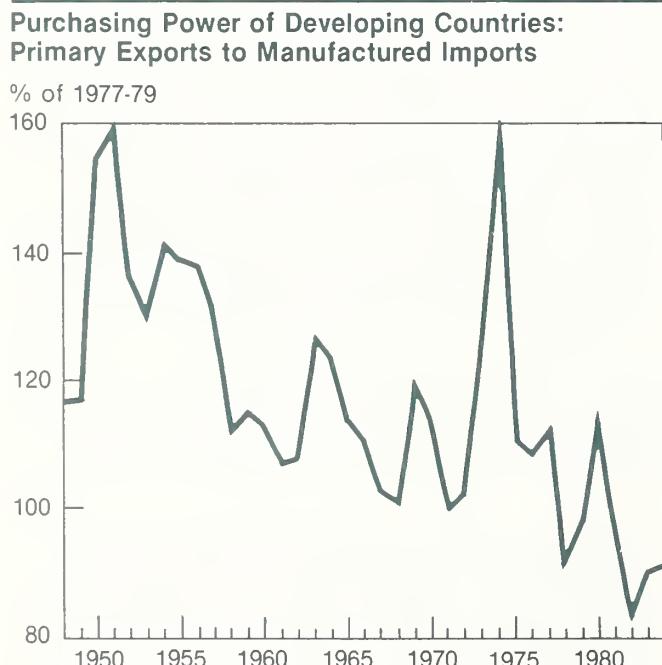


Figure 2

**“Real” Banana Prices, 1980**

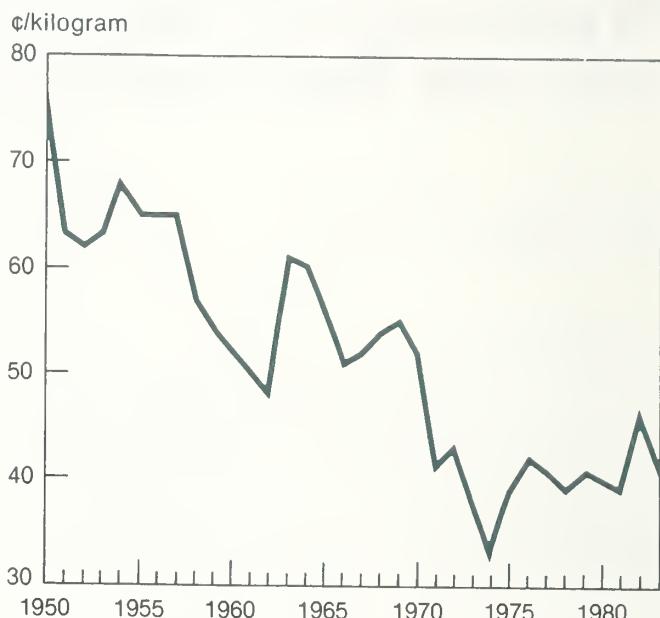
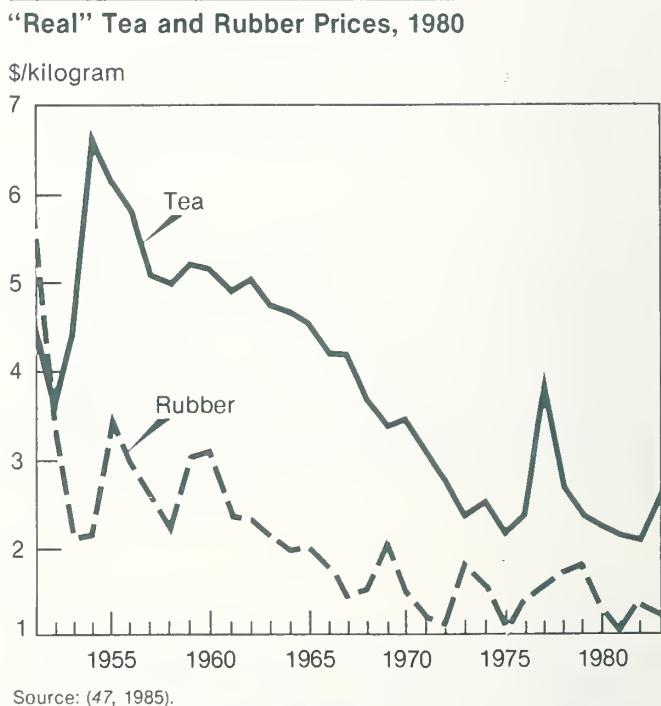


Figure 3



world, or international prices for manufactured exports from the developed countries increase more than their sales decrease, or both. Income-induced changes in the foreign demand for developed and developing countries' exports may, therefore, cause developing countries to become less able to purchase commodities from abroad and also less able to generate foreign exchange.

Whenever external terms of trade decline, developing countries may lose some of the gains of trade. The declining price ratio of primary exports to manufactured exports is, therefore, logically used as a part of the explanation for the growing income disparity between developed and developing countries. However, I contend that international trade can help close, not widen, the income gap if developing countries can identify and exploit their current and future comparative advantage and make appropriate decisions about resource allocation, capital investment, and use of modern technology.

## Countering the Resistance to Free Trade

The view that trade widens the income gap between the developed and the developing world contradicts the theoretical proposition that commodity trade leads to equalization of labor and other factor returns as stated in the Stolper-Samuelson factor price equalization theorem (44). That view is also inconsistent with the changing pattern of global production and world trade. Finally, internally balanced growth, with its implicit nontrade orientation, is the alternative to unbalanced growth characterized by increased trade and specialization.<sup>4</sup> But, balanced growth does not appear to be a reasonable option in most developing countries, because it usually requires very large capital infusions, often from substantial foreign investment, in order to augment domestic savings. However, developing countries are becoming less receptive to outside intervention and developed countries are increasingly unwilling

<sup>4</sup>Balanced growth envisages development of a large number of different industries more or less simultaneously with the idea of establishing a pattern of mutually supporting investment. Hence, there is little need for trade. Unbalanced growth recognizes that development usually proceeds unevenly and that growth is initiated by the leading sectors of the economy.

<sup>5</sup>Foreign development assistance budgets are being reduced in many developed countries. Commercial bankers are increasingly reluctant to expand their investment portfolios by augmenting the value of loans being extended to developing countries. In fact, capital flows reversed themselves in 1984 when the net flow of funds from the developing countries to the developed world was \$11 billion (49). Such resource losses complicate developing countries' attempts to sustain the pace of internal development.

to directly promote economic development in developing countries.<sup>5</sup>

## Developing Countries and the International Market

Prolonged focus on improving the production and overseas marketing of commodities whose relative international prices are declining may damage a country's income growth. Damage could result when, despite increases in productivity and per capita production, unfavorable international prices deteriorate a country's terms of trade more than enough to offset the increased export volume, lowering foreign exchange revenues.

The use of export to import prices as a longrun welfare measure can, however, be misleading. Technological improvements, for instance, are often not accurately reflected in comparative commodity price ratios. International terms of trade do not reflect the tremendous improvement in the quality and variety of manufactured imports of both consumer and capital goods, such as electronics, aircraft, and many new products in the chemical and pharmaceutical fields. Exports of primary commodities and goods produced with relatively unskilled labor have not improved much over time. A mix of primary goods in 1985 buys a much improved set of manufactured imports than what that same mix of primary goods bought in 1950. Therefore, most developing countries, even those with declining terms of trade, are most likely better off in an absolute sense because of international exchange.

Another shortcoming of the one-dimensional relationship of export to import prices is that it ignores what has happened to productivity or employment. Terms of trade changes evoke reallocation in resource use. Consequently, the net outcome of a shift in export to import prices is not always immediately clear. Real income may actually increase, for example, in a country with declining terms of trade if productivity, employment, or both sufficiently increase. Thus, assigning welfare significance to changes in the ratio of received export prices to paid import prices can be ambiguous, especially as the domestic economy adjusts to changes in both traded and nontraded prices.

But let us assume that changes in agriculture's international terms of trade provide an accurate gauge of relative shifts in welfare between the developed and developing countries. Terms of trade in agriculture tend to decline because of scientific and technological progress and the changing nature of commodity supply and demand (table 1). The

Table 1—Barter price of food in terms of manufactures,  
1870-1982  
(annual averages)

Years <sup>1</sup>	Index
1913 = 100	
1870-79	115.6
1880-89	112.1
1890-99	103.0
1900-09	97.5
1910-13	100.3
1921-29	83.6
1930-38	72.1
1950	100.1
1977-79 = 100	
1948-57	119.9
1958-67	94.7
1968-72	94.2
1973-77	116.2
1978-82	86.8

<sup>1</sup>Excludes years for World Wars I and II.

Source: For 1870-1950 (29); for 1948-82 (47, 1982).

relative food to manufactured commodity price trends indicate that agriculture's terms of trade gradually but steadily declined over the course of the last three decades, with the exception of the 1973-74 crisis years (47). These trends are not unlike Lewis' findings concerning the behavior of relative food prices in world trade from 1870 to 1950 (30).<sup>6</sup>

Consumers in developing countries benefit from declining international terms of trade for the agricultural commodities they import because food costs fall while the quantity of food consumed increases. Furthermore, consumers in developing countries gain comparatively more than consumers in developed countries from lower agricultural prices because low-income consumers spend more of their income on food.

Developing countries' imports of food and agricultural raw materials have increased substantially, particularly within the last decade when agricultural imports increased from \$10.6 billion in 1970 to \$54.0 billion in 1979, a 60-percent increase in the real value of agricultural goods imports.<sup>7</sup> Many con-

<sup>6</sup>It is not possible to combine these two indexes, creating a single comparable price series, because the agricultural and industrial commodity basket has changed and because of changes in the base year of the two index series.

<sup>7</sup>Expressed in 1975 terms, developing countries' agricultural imports increased from \$22.9 billion to \$37.4 billion between 1970 and 1979.

sumers in developing countries would, therefore, have had lower real income in the absence of trade because domestic prices for many food items would have been higher.

### Structural Differences in Country Economies

Another reason for resisting free trade is the debatable contrast in how goods are produced in developed and developing countries. The monopsonistic-type structure of manufacturing in many developed countries permits labor to obtain large wage increases during economic upswings and to sustain these increases during economic downswings. These actions are not allowed under the more competitive situations frequently found in developing countries' agriculture. Based on this alleged structural difference, Prebisch concludes that the terms of trade are inherently unequal between developed and developing countries and that they will probably worsen (36). Productivity increases lower commodity prices under conditions of pure competition in developing countries but increases returns to land, labor, and other production factors in markets deviating from the competitive structure in the developed world.

There is nothing wrong with this logic, if only it were more consistent with observation. Marketing organizations for commodity exports in developing countries may incorporate noncompetitive elements which are not present in developed countries. For example, parastatals dominate the marketing of major agricultural commodities in developing countries.<sup>8</sup> In developed countries, by contrast, many different merchants and businesses are involved in marketing manufactured goods exported to the developing countries.

### The Evolving Pattern of Trade

Underlying the exploitation thesis is the assumption that the traditional pattern of trade and specialization characterizes international exchange. In fact, however, the commodity composition of contemporary world trade patterns has changed markedly since the fifties (table 2).

Agricultural exports have become an increasingly less important source of foreign exchange (relative to other merchandise exports) throughout most of

<sup>8</sup>Parastatals are similar to state monopolies. They are large enterprises which operate somewhat as though they are private companies, but their actions and policies are controlled by the Government.

Table 2—Merchandise export performance in selected regions, 1955-81

Country or group/share	Unit	1955	1960	1965	1970	1975	1980	1981
Total exports:								
World—								
Value	Bil. dol.	94	128	186	312	873	1,994	1,961
World market share	Percent	100	100	100	100	100	100	100
Commodity share	Percent	—	—	—	—	—	—	—
Developed market economies—								
Value	Bil. dol.	60	85	128	224	577	1,261	1,235
World market share	Percent	65	67	69	72	66	63	63
Commodity share	Percent	—	—	—	—	—	—	—
United States—								
Value	Bil. dol.	15	20	27	43	106	213	226
World market share	Percent	16	16	15	14	12	11	12
Commodity share	Percent	—	—	—	—	—	—	—
Soviet Union and Eastern Europe—								
Value	Bil. dol.	11	19	28	43	111	232	236
World market share	Percent	12	14	15	14	13	12	12
Commodity share	Percent	—	—	—	—	—	—	—
Developing market economies—								
Value	Bil. dol.	24	27	36	55	211	559	545
World market share	Percent	25	21	19	18	24	28	28
Commodity share	Percent	—	—	—	—	—	—	—
Developing countries other than major petroleum exporters—								
Value	Bil. dol.	—	—	27	37	98	252	267
World market share	Percent	—	—	15	12	11	13	14
Commodity share	Percent	—	—	—	—	—	—	—
Basic manufactures: <sup>1</sup>								
World—								
Value	Bil. dol.	16	23	35	61	149	356	348
World market share	Percent	100	100	100	100	100	100	100
Commodity share	Percent	17	18	19	20	17	18	18
Developed market economies—								
Value	Bil. dol.	13	19	28	49	116	272	256
World market share	Percent	83	80	81	81	78	76	74
Commodity share	Percent	22	22	22	22	20	22	21
United States—								
Value	Bil. dol.	2	3	4	5	13	28	29
World market share	Percent	14	13	11	9	9	8	8
Commodity share	Percent	15	14	14	13	12	13	13
Soviet Union and Eastern Europe—								
Value	Bil. dol.	2	3	3	5	12	21	18
World market share	Percent	11	11	9	8	8	6	5
Commodity share	Percent	16	14	11	12	10	9	7
Developing market economies—								
Value	Bil. dol.	1	2	3	6	20	59	66
World market share	Percent	9	8	9	11	13	16	19
Commodity share	Percent	6	7	9	12	9	10	12
Developing countries other than major petroleum exporters—								
Value	Bil. dol.	—	—	3	6	19	56	64
World market share	Percent	—	—	9	10	13	16	18
Commodity share	Percent	—	—	11	17	20	22	24

See footnotes at end of table.

—Continued

Table 2—Merchandise export performance in selected regions, 1955-81—Continued

Country or group/share	Unit	1955	1960	1965	1970	1975	1980	1981
Food: <sup>2</sup>								
World—								
Value	Bil. dol.	15	17	24	46	115	222	221
World market share	Percent	100	100	100	100	100	100	100
Commodity share	Percent	16	14	13	15	13	11	11
Developed market economies—								
Value	Bil. dol.	8	9	14	27	73	144	145
World market share	Percent	51	54	61	59	63	65	66
Commodity share	Percent	12	11	11	12	13	11	12
United States—								
Value	Bil. dol.	3	4	6	7	21	39	42
World market share	Percent	17	22	24	15	18	18	19
Commodity share	Percent	16	19	21	16	20	18	18
Soviet Union and Eastern Europe—								
Value	Bil. dol.	2	3	3	4	9	12	12
World market share	Percent	11	16	12	9	7	5	5
Commodity share	Percent	14	15	10	10	8	5	5
Developing market economies—								
Value	Bil. dol.	9	9	11	15	33	63	61
World market share	Percent	59	53	48	32	29	29	28
Commodity share	Percent	37	34	32	26	16	11	11
Developing countries other than major petroleum exporters—								
Value	Bil. dol.	—	—	11	13	31	59	58
World market share	Percent	—	—	45	29	27	27	26
Commodity share	Percent	—	—	39	36	32	23	22
Agricultural raw materials <sup>3</sup>								
World—								
Value	Bil. dol.	12	14	15	18	34	75	69
World market share	Percent	100	100	100	100	100	100	100
Commodity share	Percent	13	11	8	6	4	4	4
Developed market economies—								
Value	Bil. dol.	6	7	8	11	21	46	41
World market share	Percent	49	53	58	58	62	62	60
Commodity share	Percent	10	9	7	5	4	4	3
United States—								
Value	Bil. dol.	1	2	1	2	4	11	10
World market share	Percent	8	13	10	12	13	15	14
Commodity share	Percent	6	9	5	5	4	5	4
Soviet Union and Eastern Europe—								
Value	Bil. dol.	2	2	3	3	6	12	17
World market share	Percent	13	13	19	16	19	16	25
Commodity share	Percent	14	10	10	7	6	5	7
Developing market economies—								
Value	Bil. dol.	5	5	4	5	8	20	17
World market share	Percent	40	36	29	30	25	27	24
Commodity share	Percent	20	18	12	10	4	4	3
Developing countries other than major petroleum exporters—								
Value	Bil. dol.	—	—	3	5	7	16	14
World market share	Percent	—	—	24	27	22	22	21
Commodity share	Percent	—	—	13	13	7	7	5

— = Data not available for calculation.

<sup>2</sup>"Basic manufactures" (Standard and Industrial Trade Classifications (SITC) 6 + 8 - 67 - 68) include furniture, clothing, handbags, footwear, watches, clocks, plumbing, heating, and lighting equipment; manufacture of leather, rubber, wood, textile yarn, fabrics, cement, glassware, pottery and metal goods made of copper, nickel, aluminum, lead, zinc, uranium, and tin, but excluding iron, steel, and certain nonferrous metals (50).

<sup>3</sup>"Food" (SITC 0 + 1 + 22 + 4) includes food, live animals, tobacco, oil seeds, animal and vegetable oil and fats.

<sup>3</sup>"Agricultural raw materials" (SITC 2 - 22 - 27 - 28) include hides, skins, furs, crude rubber, wood lumber, cork, pulp, textile fibers, crude animal and vegetable materials.

Source: (45, 1984).

the world, including the developing countries. Developing countries steadily reduced both the market and commodity shares of their exports of food and agricultural raw materials between 1955-81. They have diversified their economies because of impressive growth in industry. As a consequence, developing countries now successfully compete on the international market for basic manufactures, such as clothing, footwear, furniture, electrical machinery, and manufactures of nonmetal minerals. In fact, by the early eighties, the foreign exchange developing countries generated by exporting basic manufactured goods approached their earnings from exporting food and agricultural raw materials. Moreover, the proportion of their total sales of basic manufactures to developed countries also increased, supporting the view that developing countries are effectively penetrating industrial markets formerly dominated by the developed countries (table 3).

Dramatic industrial expansion occurred in developing countries which are not major exporters of petroleum. The proportion of foreign exchange earnings in these nations attributable to basic manufactured commodities rose to 24 percent by 1981, having more than doubled within 16 years.<sup>9</sup> By contrast, the importance of agricultural exports substantially declined in these countries. In 1965,

<sup>9</sup>Market penetration of basic manufactures by developing countries other than major petroleum exporters increased at the expense of smaller market shares for both the planned economies of the Soviet Union and Eastern Europe, which declined 36 percent between 1965-81, and the developed market economies of the West, which declined 9 percent.

food and agricultural raw materials provided 52 percent of merchandise export earnings in developing countries not exporting petroleum, but decreased to 27 percent in 1981.

The United States does not conform to the pattern of declining importance of agricultural exports. The comparative importance of food and agricultural raw materials to total U.S. merchandise exports remained fairly stable between 1955 and 1981. During those 26 years, the United States by-and-large retained its share of the world's market for agricultural commodities. The value of U.S. exports of food and agricultural raw materials exceeded \$51 billion in 1981, representing a tripling in the volume of actual exports since 1966. By contrast, both the market and commodity shares of basic manufactures for the United States steadily declined within this period.

Production of export goods has increasingly diversified in most developing countries, except for a group of the lowest income countries. Developed countries tend to export a highly diversified product mix which the developing countries generally try to emulate. Commodity concentration indices<sup>10</sup> and the average number of commodity exports at the three-digit Standard International Trade Classification (SITC) level for 1970 and 1980 (weighted by country population and per capita wealth) within each of four per capita income groupings and the world are presented in table 4. While each type of market

<sup>10</sup>These indices range between zero and 1.0; 1.0 represents the most extreme commodity concentration.

Table 3—Market penetration of developing countries' exports, 1955-80

Importing region	1955	1960	1965	1970	1975	1980
Percent						
Total exports:						
Developed countries	73	74	73	74	72	72
Developing countries	25	23	21	20	24	25
Soviet Union and Eastern Europe	2	4	5	5	4	3
Agricultural exports:						
Developed countries	78	76	72	73	63	61
Developing countries	19	18	17	17	24	26
Soviet Union and Eastern Europe	3	6	10	10	13	12
Manufactured exports:						
Developed countries	47	57	58	65	65	66
Developing countries	53	41	37	29	31	32
Soviet Union and Eastern Europe	1	2	5	6	4	2

Source: Calculations made from data published in (45, 1984).

economy exported more commodities in 1980 than in 1970, suggesting increased specialization in world production, the number of commodity exports grew dramatically in the middle and upper middle income developing countries. Developing countries with per capita incomes averaging \$500 to \$1,500 exported 56 different commodities by 1980, a 30-percent increase from 1970; developing countries with per capita incomes higher than \$1,500 increased the number of their exported commodities to 63, a 23.5-percent increase on average (45).

Changes in export concentration indices provide additional evidence that the middle and upper middle income developing countries successfully diversified their commodity exports between 1970 and 1980. By contrast, 1980 concentration indices were higher in both the lower income and developed countries than in 1970, signifying a shift toward more, not less, concentration of commodity exports during the seventies. The association between the relatively rapidly growing developing countries and increasingly diverse commodity exports suggests that developing countries should open their economies more to the international market and that they should expand into specific manufacturing areas where there are opportunities for growth and a potential to become competitive.

This discussion has focused on industrial versus agricultural specialization under the presumption, shown to be oversimplistic and inaccurate, that developing countries specialize in agricultural exports while the developed countries, including the United States, specialize in manufactured products. The structure of world production, the pattern of commodity trade flows, and the degree of country specialization, however, have changed dramatically in recent years. One may conclude, therefore, that the assumption underlying the argument that international exchange widens the income gap between the industrialized developed and the agriculturally dominated developing countries is inconsistent with the changing commodity composition of world trade and with the declining relative importance of primary goods exports in many developing countries.

### External Terms of Trade

Examining developing countries' external terms of trade gives a more unbiased and realistic indicator of how developing countries have fared from participating in the global market. External terms of trade are composite measures of all exported and imported commodities, not just agricultural or manufactured goods. Analyses of movements in the exter-

Table 4—Diversification by commodity exports by country category<sup>1</sup>

Level of development (1980 per capita income)	Countries	Commodities exported		Commodity export concentration	
		1970	1980	1970	1980
Number					
Developing countries (below \$500)	35	32	37	0.267	0.345
Developing countries (\$500-\$1,500)	44	43	56	.412	.383
Developing countries (above \$1,500)	43	51	63	.392	.358
All developing countries	25	154	161	.112	.121
World	147	61	71	.288	.195

<sup>1</sup>Prior to grouping by level of development, commodity exports included only those products at the three-digit SITC level which were greater than \$50,000 in 1970 or \$100,000 in 1980 or more than 0.3 percent of an individual country's total exports.

<sup>2</sup>The Hirschmann's index is normalized to make values ranging from 0 to 1 (maximum concentration) according to the following formula:

$$H_j = \frac{\sqrt{\sum_{i=1}^{182} \left( \frac{x_i}{X} \right)^2} - \sqrt{1/182}}{1 - \sqrt{1/182}}$$

where  $j$  = country index;  
 $x$  = value of exports of commodity  $i$ ;

$$X = \sum_{i=1}^{182} x_i \text{; and}$$

182 = number of products at the three-digit SITC level.

Source: (45, 1983).

nal terms of trade do not reveal any systematic bias against the developing countries. Empirical observations of ratios of export and import prices support the view that world trade is not hurting developing countries.

In the aggregate, developing countries' external terms of trade have actually improved compared with relative export and import prices in developed countries since 1960 (fig. 4). The external terms of trade were quite stable between 1960-73 in both the developed and developing country groups, although there was a slight deterioration among developing countries. Relative export to import prices then rose dramatically in developing countries, especially between 1973-74 and 1978-81; the same price ratios declined fairly steadily in the developed countries after 1973.

These results do not mean that the external terms of trade have moved substantially in favor of most developing countries, however, because the oil-exporting developing countries are included in that grouping. A very different picture emerges about how export prices move in relation to import prices between developed and developing countries when the oil-exporting countries are excluded from the

developing countries group (fig. 5). Throughout most of the sixties, external terms of trade for developing countries other than major petroleum exporters improved slightly but more erratically compared with the terms of trade for all developed countries.

Relative export to import prices deteriorated almost everywhere except for the OPEC countries following jumps in oil prices during the seventies, but especially after 1977 for the developing countries which were not exporting much petroleum.<sup>11</sup> Consequently, many developing countries now face severe debt repayment difficulties and slow economic growth.

Developing countries emphasizing agriculture have fared reasonably well relative to those specializing in industrial production, based on an analysis of external terms of trade movement for developing coun-

Figure 4

**External Terms of Trade for Developed and Developing Countries, 1960-83**

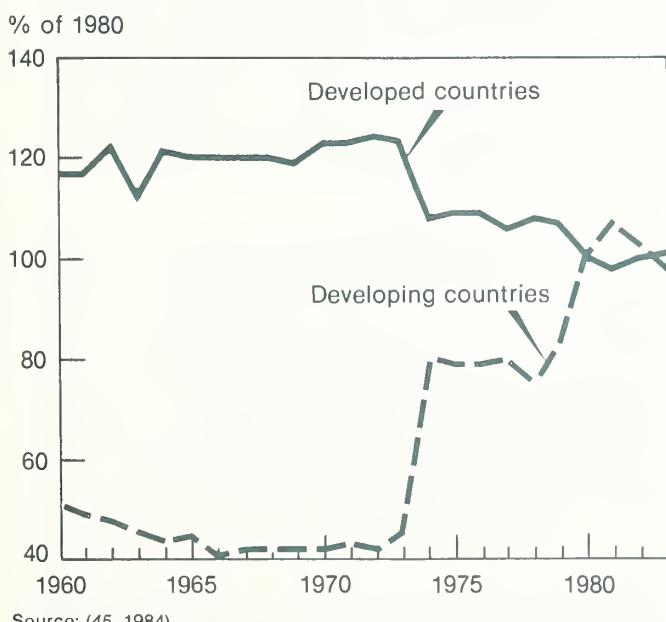
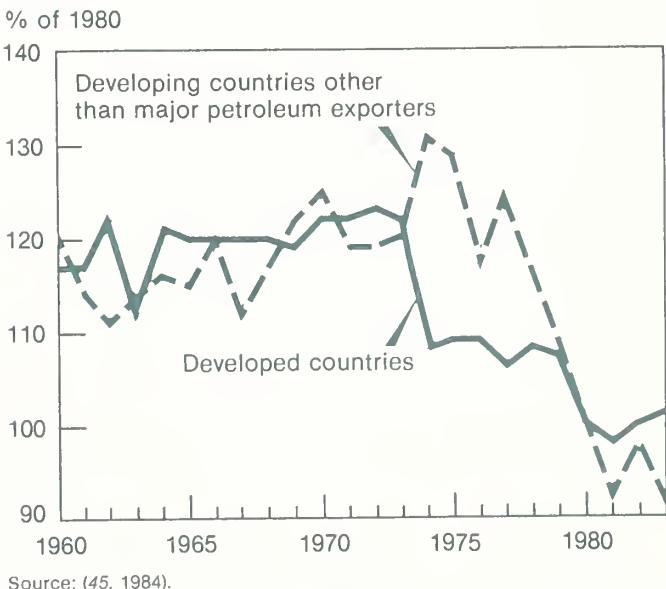


Figure 5

**External Terms of Trade for Developed and Developing Countries Other than Major Petroleum Exporters, 1960-83**



<sup>11</sup>The comparatively poor performance of relative traded good prices in the developing countries which do not export oil, after the second oil shock beginning in 1977, was largely because of the reluctance of international commercial bankers to accommodate the financial needs of developing countries. These bankers had previously overextended their investment portfolios in the developing countries after the first oil crisis of 1973-74 (39).

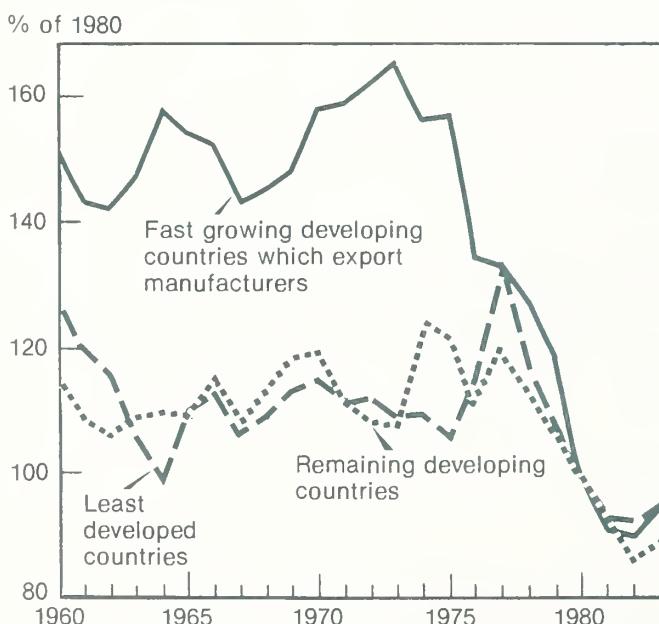
tries which do not export oil (fig. 6). The terms of trade for the developing countries which are among the fast-growing exporters of manufactures improved fairly steadily until the midseventies. External terms of trade for these countries fell substantially following 1973 because of the first oil crisis, leveled off somewhat between 1976-78, then dropped precipitously because of the second oil shock in 1979-80, reflecting the industrial sector's dependence upon relatively inexpensive energy. In contrast to the fast-growing exporters of manufacturers, the other developing countries (both the least developed countries whose economies are primarily agriculturally based and the remaining developing countries whose economies consist of a blend of agricultural and manufacturing activities) experienced relatively favorable export to import price movements during the past 24 years.

## Dynamics of Comparative Advantage

Comparative advantage is defined prior to trade using prices which are not distorted by Government policies. It is based upon the notion that a country will tend to export that commodity whose relative or comparative cost is lower than in other countries.

Figure 6

### External Terms of Trade for Selected Groups of Developing Countries Other than Major Petroleum Exporters, 1960-83



Source: (45, 1984).

Graphically illustrated, a comparative advantage exists in producing a particular good whenever the intersection of own relative demand and relative supply is below the juncture of the relative demand and relative supply of a potential trading partner. For example, in figure 7, the rest of the world has a comparative advantage in food with respect to clothing because the relative foreign price for food ( $P_{ff}/P_{fc}$ ) is lower than the relative domestic price ( $P_{df}/P_{dc}$ ). This comparative advantage is attributable to the fact that the foreign supply for food ( $S_{ff}/S_{fc}$ ) is greater than relative domestic supply ( $S_{df}/S_{dc}$ ) and that the relative foreign demand for food ( $D_{ff}/D_{fc}$ ) is less than the home country food demand ( $D_{df}/D_{dc}$ ). The domestic economy has, therefore, a comparative disadvantage in producing food and a comparative advantage in producing clothing.

Comparative advantage is not a static phenomenon; rather it is subject to change over time. Dynamic comparative advantage is a process where the best mix by location of commodity production among countries changes consistently with changing relative supply and demand both at home and abroad.<sup>12</sup> For example, in figure 8, the home country develops a comparative advantage in food production while losing it in clothing. The domestic relative demand for food shifts from  $D_{df1}/D_{dc1}$  in the initial period to  $D_{df2}/D_{dc2}$  in the second period, signifying an increase in the home country demand for clothing by comparison with its demand for food, perhaps because of a relatively greater income elasticity of demand for clothing. The home country's relative supply for food shifts to the right (from  $S_{df1}/S_{dc1}$  to  $S_{df2}/S_{dc2}$ ), denoting an increase in the domestic supply of food relative to clothing because of technological change and comparatively larger investments in agriculture than in textiles, for example.

Structural changes may also occur in the rest of the world. For example, in figure 8, both the relative foreign demand and the relative foreign supply for food increased from  $D_{ff1}/D_{fc1}$  and  $S_{ff1}/S_{fc1}$  in the initial period to  $D_{ff2}/D_{fc2}$  and  $S_{ff2}/S_{fc2}$  subsequently. However, in this case, the changes in foreign demand balanced changes in foreign supply, neutralizing the effect of food's relative foreign price. The net result of all of these domestic and foreign relative shifts in supply and demand was a move-

<sup>12</sup>The means through which changes in comparative advantage occur is detailed in (46).

ment away from a comparative advantage in clothing toward a comparative advantage in food in the home country (and vice versa for the rest of the world).

According to conventional understanding, a country should export commodities for which it has a comparative advantage and import commodities for which it has a comparative disadvantage in order to maximize social welfare and stimulate economic development. Appreciation of the dynamics of comparative advantage, however, is less well understood. Because of the changing country/commodity composition of comparative advantage, one should not only identify existing patterns of comparative advantage, one should also have a reasonable idea of what to expect in the future. Therefore, ascertaining probable changes in both internal commodity demand and supply as well as external commodity

ty demand and supply is useful. Projecting changes in comparative advantage can facilitate appropriate investment decisions, providing assurance that resources will be used in accordance with the evolving pattern of comparative advantage.

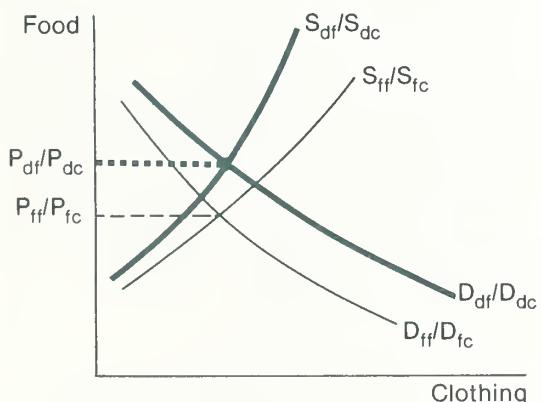
### The Guiding Role of the Open Market

Although developing countries no longer exclusively export primary products and import manufactured goods, some developing countries are still highly dependent upon a single agricultural export commodity.<sup>13</sup> Developing countries have often found it

<sup>13</sup>Coffee represents almost 90 percent of Burundi's recorded exports and more than 50 percent of Colombia's. Other examples include cocoa in Ghana (70 percent) and sugar in Mauritius (more than 65 percent).

Figure 7

#### Comparative Advantage and Disadvantage, Food and Clothing



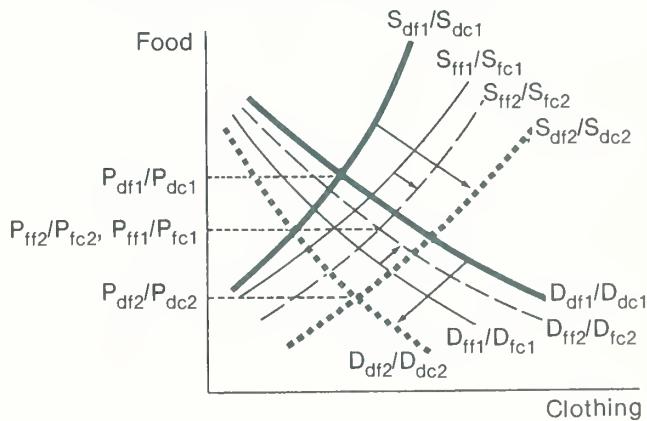
$D_{df}$  = domestic demand for food  
 $D_{dc}$  = domestic demand for clothing  
 $D_{df}/D_{dc}$  = relative domestic demand for food

$S_{df}$  = domestic supply of food  
 $S_{dc}$  = domestic supply of clothing  
 $S_{df}/S_{dc}$  = relative domestic supply of food

$P_{df}$  = domestic price of food  
 $P_{dc}$  = domestic price of clothing  
 $P_{df}/P_{dc}$  = relative domestic price of food

Figure 8

#### Dynamic Comparative Advantage and Disadvantage, Food and Clothing



$D_{ff}$  = foreign demand for food  
 $D_{fc}$  = foreign demand for clothing  
 $D_{ff}/D_{fc}$  = relative foreign demand for food

$S_{ff}$  = foreign supply of food  
 $S_{fc}$  = foreign supply of clothing  
 $S_{ff}/S_{fc}$  = relative foreign supply of food

$P_{ff}$  = foreign price of food  
 $P_{fc}$  = foreign price of clothing  
 $P_{ff}/P_{fc}$  = relative foreign price of food

1 = initial period  
 2 = subsequent period

difficult to displace production in established commodity areas within developed countries despite the fact that their resource costs are comparatively low and further improvements in efficiency could occur. Part of the problem is that resources in many developing countries are relatively immobile because of poor transmission of information. In developed countries, by contrast, returns to inputs are not only comparatively high but are bid upward even in relatively unprofitable enterprises because of the high degree of internal resource mobility and efficient communication between markets about existing price differentials. Increased competition from the developing countries would, undoubtedly, drive these marginal enterprises in the developed countries out of business.

Both developed and developing countries need to make their economies more open to international markets so that relative price differentials among countries can better guide internal production activity. Investments could be more firmly grounded upon the principle of comparative advantage. Probable results of such a policy shift are increased manufacturing diversification in developing countries, displacement of certain economic activities in developed countries, and higher incomes in both developed and developing countries because of a more efficient allocation and use of global resources.

If a country ignores the pattern of comparative advantage and its dynamics in international markets, trade can result in growth which is actually detrimental to domestic social welfare because of the transfer of a significant proportion of the benefits of increased production and productivity to the rest of the world. For example, when expansion of output in a developing country is primarily confined to commodities experiencing relative price declines, trade-induced degeneration may occur if the foreign import demand for the developing country's exports is less responsive to price changes and increases in income than is that developing country's domestic demand for commodity imports. Such a situation is often the case for tropical goods that are essentially noncompetitive with goods produced in developed countries.

There is a problem whenever developing countries are not able, unlike most developed countries, to respond to adverse price changes and to reallocate resources into more productive activity. Unfortunately, a fall in the price of a developing country's exports compared with prices of imports

often induces small cutbacks in the production of traditional exports because of an insulated environment and excess, unskilled labor. Low production responsiveness to relative price reductions can keep returns to inputs within developing countries depressed, especially if that lack of adaptability is widespread throughout the economy. However, international exposure induces responsiveness to relative price changes, altering the pattern of factor use and assuring a country a competitive position in the world market (46).

However, recent changes in the pattern of specialized production and the commodity composition of world trade suggest that many developing countries have, in fact, been responsive to open market signals despite the existence of trade barriers.

### **The Pattern of "Revealed" Comparative Advantage**

One difficulty with measuring comparative advantage is that it is defined in terms of pretraded relative prices, not actually traded relative prices. Another complication is that artificially imposed restrictions, such as import quotas, tariffs, licensing requirements, and subsidies, distort actual prices. Hence, there are difficulties using observed trade patterns to measure the real pattern of comparative advantage. Efforts have, nevertheless, been made to quantify comparative advantage based upon existing trade data (3). These measures are "revealed," but not completely accurate, estimates of actual comparative advantage because the assumption that commodity trade patterns reflect intercountry differences in relative costs is an oversimplification of market interference in the real world.

Market interference may occur whenever social welfare conflicts with private welfare because of attempts to protect vested interest. These conflicts are more likely to arise among producers vulnerable to loss of their domestic market because of import competition than among producers of export commodities who usually have already established a competitive edge in world markets. When measuring comparative advantage, it is, therefore, often preferable to work with export data, which have fewer distortions than import data (19).

Examining estimates of revealed comparative advantage using relative export shares provides some insight into the changing character of international

trade.<sup>14</sup> The coefficient of revealed comparative advantage for agricultural raw materials in the United States did not exceed one until 1975, suggesting that prior to the midseventies the United States had a comparative disadvantage in this area (table 5). Between 1955 and 1980, the United States' revealed comparative advantage in food production increased more than 50 percent while its revealed comparative advantage in agricultural raw materials almost tripled. By contrast, the entire group of developing countries experienced about a 45-percent decline in revealed comparative advantage in food and a 60-percent drop in agricultural raw materials (figs. 9 and 10). Developing countries which do not export oil, however, have a revealed comparative advantage in agriculture with respect to the rest of the world that has averaged almost twice that of the United States since 1965, underlying the continued importance of agriculture in many developing countries.

<sup>14</sup>The export share measure of comparative advantage is considered a preferable indicator of revealed comparative advantage than is another indicator, the ratio of exports to imports. The composition of imports is greatly affected by protectionism while the composition of exports embodies comparatively few distortions and is, therefore, more consistent with the real pattern of comparative advantage. The export share measure of revealed comparative advantage entails dividing the share of country *j*'s exports in world trade of good *i* by the country's share of the total world trade:

$\beta_j^i = (X_j^i/W_j^i)/(T^i/Z)$  where the subscript *i* is a good, the superscript *j* is a country,  $X$  is country *j*'s exports of good *i*,  $T$  is country *j*'s total exports,  $W$  is total world trade in good *i*, and  $Z$  is total world trade.

The level of comparative advantage in basic manufacturing for the developing countries (other than major petroleum exporters) more than doubled between 1965-80, attaining a revealed coefficient of 1.26 in 1980. By contrast, the revealed comparative advantage in primary manufacturing in the United States remained fairly stable during the 20-year period prior to 1980. These data strongly suggest that the developing countries not exporting oil are becoming increasingly competitive in basic manufacturing and have, in fact, been successful in penetrating world markets. Figures 11 and 12 demonstrate that the pattern of comparative advantage changes over time.

### Growth Strategies for Developing Countries

Promoting diversification as a part of a strategy that leads to increased production of commodities for which a country has a comparative disadvantage reduces social welfare and trade. However, increased diversification leading to increased production of commodities for which a country either already has or can actually develop a comparative advantage will improve societal well-being and trade.

The economic growth of developing countries during the sixties and early seventies was largely led by diversification into basic manufacturing. A less aggregated approach shows, however, that rapid growth of manufactured exports was concentrated in com-

Table 5—Revealed comparative advantage in selected regions, 1955-80

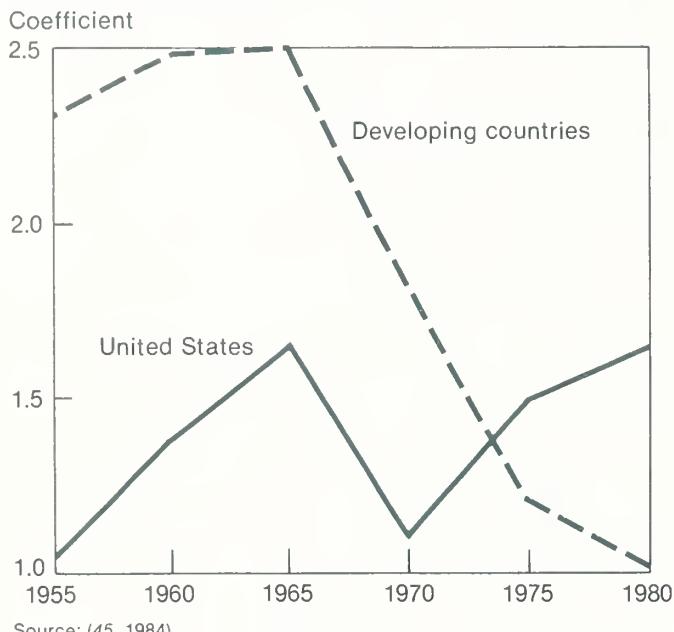
Exported commodity/region	1955	1960	1965	1970	1975	1980
Coefficients						
Food:						
United States	1.04	1.38	1.65	1.09	1.49	1.64
Developing countries	2.31	2.48	2.49	1.81	1.20	1.02
Developing countries other than major petroleum exporters	—	—	3.07	2.47	2.44	2.11
Agricultural raw materials:						
United States	.48	.82	.70	.84	1.07	1.36
Developing countries	1.59	1.69	1.49	1.71	1.03	.96
Developing countries other than major petroleum exporters	—	—	1.60	2.28	1.92	1.73
Basic manufactures:						
United States	.86	.78	.73	.65	.71	.74
Developing countries	.35	.39	.46	.60	.55	.59
Developing countries other than major petroleum exporters	—	—	.59	.87	1.15	1.26

— = Data not applicable for calculation.

Source: Coefficients derived from data published in (45, 1984).

Figure 9

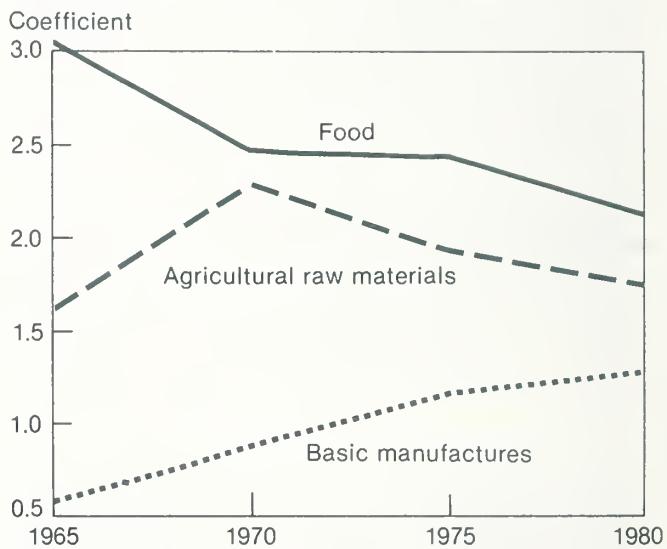
**Revealed Comparative Advantage for Food: United States and Developing Countries**



Source: (45, 1984).

Figure 11

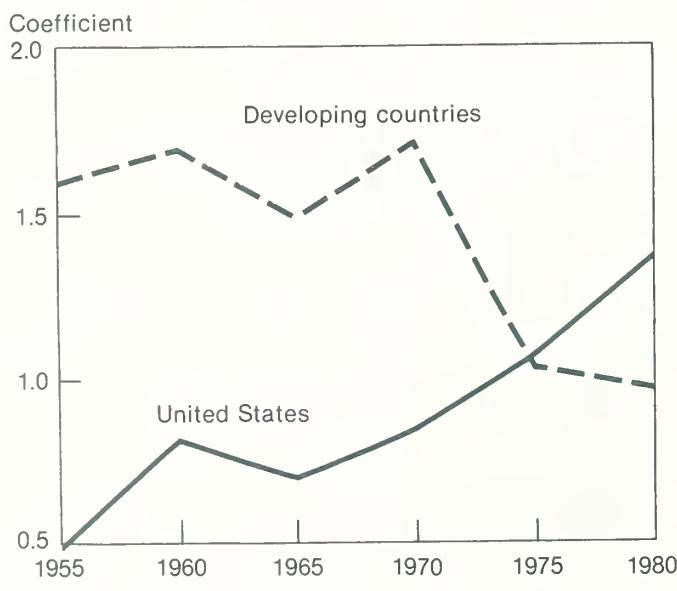
**Revealed Comparative Advantage in Developing Countries Other than Major Petroleum Exporters: Food, Agricultural Raw Materials, Basic Manufactures**



Source: (45, 1984).

Figure 10

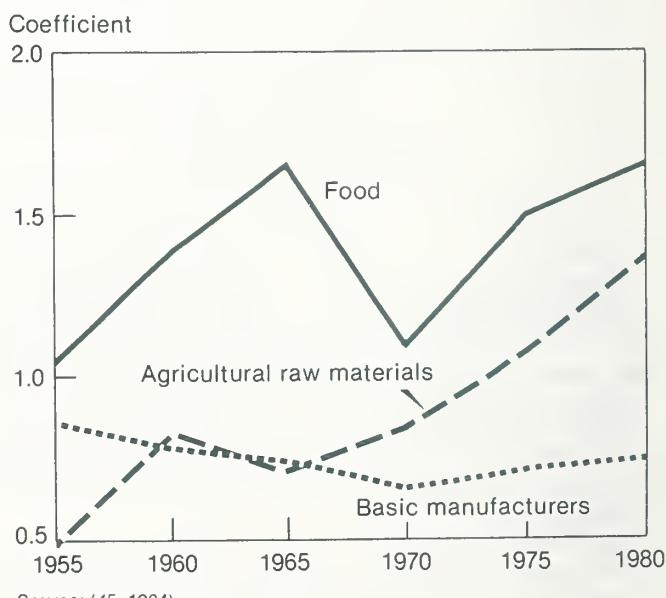
**Revealed Comparative Advantage for Agricultural Raw Materials, United States and Developing Countries**



Source: (45, 1984).

Figure 12

**Revealed Comparative Advantage in the United States: Food, Agricultural Raw Materials, Basic Manufactures**



Source: (45, 1984).

paratively few countries, the so-called "newly industrialized countries," collectively containing only about one-third of the population in developing countries. Primary commodity exports still constitute the major source of foreign exchange in other developing countries, particularly in Africa and South Asia where per capita incomes are exceptionally low.

Balassa (2) defines the newly industrialized countries as being "developing countries with per capita incomes in excess of \$1,100 in 1978 and where the share of the manufactured sector in GDP (gross domestic product) was 20 percent or higher in 1977." According to this definition, the following countries are included within the category: Argentina, Brazil, Hong Kong, Israel, Mexico, Republic of China, Republic of Korea, Singapore, and Yugoslavia. India is also on the list because its industrial sector is larger than any other developing country with the exception of Brazil and Mexico.

Havrylyshyn and Alikhani (17) conclude, after having identified 12 developing countries which are not included in the original 10 but whose expansion of manufactured exports grew faster than anywhere else in the world between 1970 and 1979, that other developing countries can, in fact, follow the pattern of development and growth of Balassa's 10 countries. The 12 new manufactures-exporting developing countries identified are Colombia, Cyprus, Indonesia, Jordan, Malaysia, Morocco, Peru, Republic of the Philippines, Sri Lanka, Thailand, Tunisia, and Uruguay. Havrylyshyn and Alikhani suggest that the Ivory Coast, Chile, Honduras, and Costa Rica might also be added to this group as their manufactured export growth rates are almost as high.

Havrylyshyn and Alikhani's findings regarding the changing composition of exports in the developing world support the "stages" approach of comparative advantage. The 12 developing countries which they identified as experiencing particularly rapid economic growth during the sixties based their export expansion on textiles, footwear, clothing, electrical machinery, and nonmetal mineral manufactures, which provided the foundation for the earlier export growth experienced by the newly industrialized countries. These newly industrialized countries, in turn, relied less on labor-intensive manufactured goods and more on engineering products requiring higher levels of skill and technological sophistication as the basis for their continued expansion of export-led growth.

The position of the United Nations Conference on Trade and Development encouraging diversification of production in developing countries induced many developing countries, especially during the fifties and sixties, to concentrate on import substitution in an effort to industrialize their economies. In order to create a diversified industrial base, an antitrade policy was often adopted which discriminated against agriculture.

Numerous empirical studies have shown, however, that developing countries experiencing comparatively slow economic growth rates were the ones that adopted import substitution strategies which, in effect, constrained international exchange (6, 27, 32, 34). By contrast, most of the fastest growing countries promoted exports. These results demonstrate the benefits of international trade for domestic growth and development.

Diversification is, indeed, a worthwhile economic goal. But the means to this objective is often increased specialization, especially in the early stages of development where intercountry differences in technologies and the availability of unimproved land and labor underlie exchange. Two-way trade (when a country simultaneously exports and imports the same generic commodity) becomes increasingly important at relatively high income levels when consumers make purchasing decisions based upon minor distinctions of product design and performance (31). But diversification and two-way trade are less relevant for developing countries, at least until per capita incomes rise sufficiently to generate the effective demand needed to support domestic industries in an open trading environment.

Development planners in developing countries should not encourage premature industrialization or diversification which runs contrary to the probable pattern of future comparative advantage. In many developing countries, a continued emphasis on increasing agricultural productivity, production, and trade is still warranted.

### Implications for U.S. Agriculture and Developing Countries

Empirical evidence demonstrates that the United States has strengthened its comparative advantage in agriculture. Because of this comparative advantage, the U.S. economy has benefited from agricultural exports expansion. Similarly, developing countries have benefited from importing U.S. agricultural products because they have been able to

pursue industries in which they have a comparative advantage.

The United States also has a comparative advantage in industries requiring a highly trained and skilled labor force such as one finds in computers, telecommunications, pharmaceuticals, and aviation. Similarly, many developing countries have a comparative advantage in specific areas within agriculture. This advantage is primarily because their tropical climates are conducive to such crops as coffee, cocoa, rubber, and palm oil and because their relatively large labor force is mostly unskilled to skilled, which rules out the production of most nonagricultural commodities requiring highly educated labor as an input into the production process.

The United States does have an absolute cost advantage relative to developing countries in producing manufactures in general, despite wage differentials. Output per industrial worker is 20 times greater in the United States than in developing countries, and in both regions, industry has grown at about the same 7.5-percent annual rate over the past two decades.

However, compared with developing countries, the United States' cost advantage is not only greater in agriculture but is widening, unlike in industry. The value of agricultural output per unit of labor in the United States increased from 50 times greater than in developing countries in 1960 to 150 times greater in 1980. A similar, but less dramatic, pattern exists with respect to the level and growth rate of agricultural output per unit of land. Land productivity in the United States was four times greater than in Africa and over double that in Latin America by 1980, increasing at twice the rate as in developing countries during the previous 20 years (9). These highly aggregated results provide additional evidence that the United States is strengthening its comparative advantage in agriculture.

Given the changing network of international exchange, the exploitation thesis (based upon a declining ratio of primary export to manufactured import prices) appears to apply more to the United States than to developing countries because of the increasing comparative importance to the United States of agricultural exports. The responsiveness of the United States to the open market and the nature of its investment in both human and physical capital has, however, generated a real and enduring U.S. comparative advantage in agriculture, assuring that commodity exchange with the rest of the world is mutually beneficial.

The United States should consider promoting developing countries' economic growth so that those countries can buy American agricultural products. Food imports increase most significantly in developing countries with rapid economic growth rates, even if this growth is concentrated in agriculture. According to Bachman and Paulino, agricultural imports have increased faster in developing countries characterized by more rapid rates of growth in agriculture than in other developing countries (1). These imports increased because outward shifts in the supply of domestic agricultural goods in the rapidly growing developing countries were inadequate to satisfy increasing local demand.

During the seventies, developing-country imports of agricultural commodities, a large proportion of which came from the United States, filled the gap created as developing-country demand outstripped domestic supply. Increases in agricultural food supply, especially in the more rapidly developing countries, will probably be modest relative to growth in domestic demand. Lower international terms of trade for agricultural goods and politically induced ceilings placed upon primary commodity prices in developing countries reduce comparative returns to agricultural activity. Furthermore, increased urbanization, which generally accompanies development, not only diminishes the agricultural labor force but also changes the composition of production and the pattern of comparative advantage. The resultant diminished agricultural labor force lowers agricultural production possibilities and increases the gap between domestic demand and supply because of more limited opportunities for consuming domestically produced food.

Comparative advantage changes as development proceeds and as capital-labor ratios increase. Investment in physical and human capital alters a country's economic structure and its relations with the rest of the world.<sup>15</sup> Thus, some of the most successful developing countries, those which have already attained or are rapidly approaching middle-income status, have relinquished their comparative

<sup>15</sup>Labor in the Republic of Korea, for instance, moved out of agriculture and into quasi- and semiskilled employment in urban areas during the period when its exports switched from 88 percent primary commodities to 90 percent industrial commodities (37). Coinciding with that expansion of industrial capacity, the average annual growth rate of its agriculture increased from 2.5 to 4.5 percent (26). Agricultural production increased primarily because of the conscious attempt by officials to promote exports. As a consequence, exchange rates had to become more realistic. The currency realignment caused the domestic price of food imports to increase during this period which provided major production incentives to South Korean agriculture.

advantage in agriculture in the process of reallocating national resources.

Developing countries approaching middle-income status which have initiated growth primarily through successful agricultural development may overemphasize agriculture as a sustaining source of growth in the future.<sup>16</sup> Developing countries which have overcome economic stagnation should identify and build cottage manufactures that are labor intensive and that are consistent with their emerging comparative advantage.

However, increased industrial production, including even basic manufactures, is clearly inappropriate for countries at the lowest income levels where capital is scarce and where an industrial comparative advantage cannot be established because manufacturing techniques use both human and physical capital intensively relative to typical technologies characterizing domestic agriculture. Production possibilities outside of agriculture in most low-income developing countries are limited because of severe resource restrictions. Therefore, in many developing countries, a continued developmental emphasis should be placed upon agriculture because this is where their comparative advantage lies, both currently and in the foreseeable future. Increasing agricultural productivity generates an agricultural surplus and upgrades the existing resource base. These developments eventually change the pattern of comparative advantage, enabling future productive activity to become increasingly concentrated in nonagricultural pursuits.

Because patterns of comparative advantage change, countries need the capability to adjust the structure of internal production whenever their future comparative advantage does not conform with their past comparative advantage. An outward orientation toward foreign markets is, therefore, critical. For a country to survive and prosper when it is exposed to the international market, the pattern of domestic production must be based on the principle of

<sup>16</sup>Lele and Mellor have pointed out that a prolonged emphasis on food production in developing countries could be detrimental to general economic growth if too much of what is locally produced in the agricultural sector is also locally consumed because of the high income elasticity of demand for agricultural goods (28). This situation generates little marketable surplus for conversion into needed foreign exchange. There is, moreover, a risk of overinvestment in such perennial cash crops as tea, cocoa, palm oil, and rubber. Virtually all tree crops take several years to mature. After having initiated planting, there is, therefore, less potential for producers of tree crops to adopt modern technology and to reap the benefits of further investment than there is for other kinds of farmers.

dynamic comparative advantage. A significant consequence of exposure to the international market is that the development process follows an optimal growth path.

However, conflicts between private and social welfare frequently arise as the pattern of comparative advantage changes because of past investments which created vested interest groups concerned with maintaining the status quo. National policies also often clash with each other because of previous efforts to promote or defend past, present, and future comparative advantages. Resolutions of these conflicts and establishment of consistent policies are hampered by the paucity of information and the absence of analyses concerning the current pattern of comparative advantage and how it is likely to change in the future.

All too often the end result of insufficient knowledge about the pattern of comparative advantage and the nature of its dynamics is a rigid adherence to the virtues of conventional production patterns. A rationale is often developed to impede the flow of trade. Barriers are erected in defense of domestic industry and against foreign goods. These actions distort the system of economic incentives, effectively restricting development and growth.

In a relatively more open and dynamic international environment than currently exists, some farmers in both the United States and in developing countries may have to reallocate their resources and produce a different mix of agricultural commodities for which their country possesses a comparative advantage. The policy challenge is to devise appropriate compensation to producers hurt by foreign competition in order to mitigate painful adjustments and to facilitate structural change which results in more productive economic activity benefiting both general consumers and specific producers.

Improved ability to identify current as well as future patterns of comparative advantage enables better decisions to be made about the allocation of national resources. Moreover, additional knowledge concerning the welfare implications of trade expansion enables appropriate measures to be taken which not only cushion the negative effects of foreign competition but also facilitate adjustments in domestic resource use, enhancing both private and social well-being.

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